Submillimeter Imaging of Debris Dust Disks

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Studying the debris disks of cold dust around nearby stars can give vital clues about the planetary formation process. The imaging of such disks gives an effective "time series" showing how planetary systems form and evolve from their primordial disks. This paper describes submillimeter observations of debris disks using the SCUBA camera on the JCMT. Surprisingly, the observations have revealed the existence of clumps and cavities within the disks and modeling has shown that these structures are evidence of perturbations from unseen planets. Furthermore, these planets have been pin-pointed and their masses and evolutionary histories determined. The disks studied so far are comparable in size to the Solar System and hence this research provides a unique way of exploring the outer regions of extrasolar planetary systems. In addition, the paper will describe some of the modeling that our group has undertaken to aid the interpretation of the disk structure. Some very recent disk images around several nearby stars will also be presented.

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